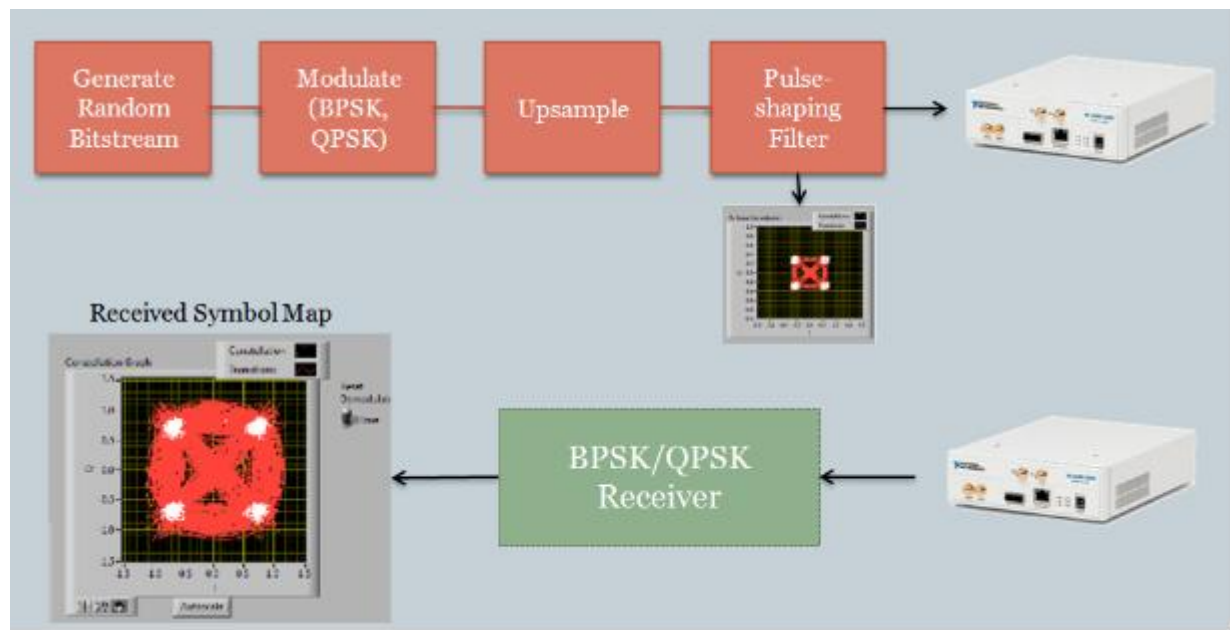


## EE49 Lab 3: Introduction to Modulation: BPSK & QPSK

### Goal

The goal of this lab is to learn about modulation, and implement the wireless transmitter for a USRP-to-USRP link. Specifically we will be implementing the pulse shaping filter (root raised cosine) and the modulator (BPSK, QPSK).

### Lab Overview



### Course Overview

This lab is from a course developed at Stanford University entitled *Building Networked Systems*. The course was first taught with a trial group of students in the Spring 2011 quarter. With the software/hardware combination of LabVIEW and the [NI USRP](#), students were able to build and explore each element of a complete communications system signal chain. The course progression covered topics including channel coding, modulation, demodulation, timing recovery and culminated with students building their own protocol.

Course evaluations affirmed that students were highly engaged in and benefited greatly from the EE 49 class. “The course evaluations for our class were fantastic,” said Katti. “Students rated the class 4.94/5.0, likely making it one of the highest rated among all classes in the School of Engineering at Stanford.” To learn more about the course view the case study entitled:

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## [Designing Hands-On Wireless Communications Labs With the NI Universal Software Radio Peripheral and LabVIEW.](#)

These materials are considered a work-in-progress and reflect the first run of the course. The course is anticipated to run again in the Spring of 2012.

### Required Components

LabVIEW Full or Pro

LabVIEW Modulation Toolkit

Two NI USRP-2920

### Experiment

The PDF laboratory procedure is attached along with starting-point VI's for the students. LaTeX source is included so that it can be customized by the instructor.

### Contact Information

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